32692
Customer Number

Patent
Case No.: 48924US031

# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

| | | | |
|---|---|---|---|
| First Named Inventor: | SMITH, KENNETH L. | | |
| Application No.: | 10/039103 | Group Art Unit: | 2872 |
| Filed: | January 4, 2002 | Examiner: | James Phan |
| Title: | FLEXIBLE CUBE-CORNER RETROREFLECTIVE SHEETING | | |

## BRIEF ON APPEAL

Mail Stop Appeal Briefs-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF MAILING
I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on:

May 12, 2004
Date

Stephen C. Jensen
Signed by: Stephen C. Jensen

Dear Sir:

## INTRODUCTION

This is an appeal from the Office Action dated 10/07/2003 finally rejecting pending claims 41, 42, 45-47, and 49-59. The Office Action also indicated pending claim 48 to be allowable. Applicants filed a Notice of Appeal on Jan. 12, 2004 (via certificate of mailing, with a deposit date of Jan. 6, 2004). A Petition for a 2-Month Extension of Time under Rule 136(a) accompanies this Brief.

This Brief is being filed in triplicate. Please charge the fee required under 37 CFR § 1.17(c) for the appeal to Deposit Account No. 13-3723. Other than this fee, and the fee authorized in the accompanying Petition under Rule 136(a), no further fee is believed to be due; however, if any such fee or petition is required, they are hereby requested and should be charged to Deposit Account No. 13-3723.

## REAL PARTY IN INTEREST

The real party in interest is 3M Company (formerly known as Minnesota Mining and Manufacturing Company) of St. Paul, Minnesota and its affiliate 3M Innovative Properties Company of St. Paul, Minnesota.

## RELATED APPEALS AND INTERFERENCES

Appellants are not aware of any related appeals or interferences.

## STATUS OF CLAIMS

Claims 41, 42 and 45-59 are pending in the application. Claims 41, 42, 45-47, and 49-59 stand rejected. Claim 48 is allowed.

## STATUS OF AMENDMENTS

No amendments have been filed after the final rejection.

## SUMMARY OF THE INVENTION

In one aspect of the invention (independent claim 45), retroreflective sheeting includes a first and second layer, the first layer including a first polymeric material having an elastic modulus less than $7 \times 10^8$ pascals, and the second layer including a second polymeric material having an elastic modulus greater than $20 \times 10^8$ pascals. (FIG. 1 and p. 6 lines 23-28.) Light can pass through the first layer between a first and second major surface thereof. The second layer has a third major surface that attaches directly or through only a thin coating to the second major surface of the first layer. (FIG. 1; p. 13 lines 9-27 and p. 14 lines 20-31.) The second layer also has a surface opposite the third major surface in which cube corner elements are formed, the cube corner elements being exposed to air. (FIG. 1, p. 8 lines 9-11.) Finally, the sheeting also includes a seal film applied to the cube corner elements to maintain an air interface at the cube corner elements. (P. 8 lines 7-11.)

In some embodiments (independent claim 48), the seal film need not be present and the thin coating is a primer. (P. 16 lines 2-6.)

In another aspect of the invention (independent claim 52), a retroreflective article includes a retroreflective sheeting having cube corner elements, and a seal film applied to the retroreflective sheeting to maintain an air interface at the cube corner elements. (P. 8 lines 7-11.) The retroreflective sheeting consists essentially of a first layer composed of a first light transmissible polymeric material, and a second layer composed of a second light transmissible polymeric material. (FIG. 1.) The first polymeric material has an elastic modulus less than $7 \times 10^8$ pascals, and the second polymeric material has an elastic modulus greater than $20 \times 10^8$

pascals. (P. 6 lines 23-28.) The second layer has a major surface attached directly or through only a thin coating to a major surface of the first layer. (FIG. 1; p. 13 lines 9-27; p. 14 lines 20-31) The second layer also has cube corner elements formed on a surface opposite the aforementioned major surface of the second layer. (FIG. 1.)

In some embodiments, the sheeting does not exhibit a substantial loss of retroreflectivity when flexed. (P. 4 lines 21-25; p. 17 line 1 to p. 18 line 2.)

In some embodiments, the second layer includes a land layer, and the land layer is integral with the cube corner elements. (FIG. 1; p. 11 lines 10-23; p. 14 lines 29-31.)

In some embodiments, the second layer attaches directly to the first layer. In others, the second layer attaches to the first layer through the thin coating, the thin coating promoting adhesion therebetween. (P. 13 lines 9-27.)

In some embodiments, the second layer consists essentially of the cube corner elements and an integral land layer. (FIG. 1; p. 11 lines 10-23.)

In some embodiments, the second polymeric material comprises poly(carbonate). In some embodiments, the second polymeric material comprises poly(methylmethacrylate). (P. 11 lines 4-9.)

In some embodiments, the first layer is an outermost layer on a front side of the sheeting. (FIG. 1.)

## ISSUE ON APPEAL

1. The primary reference (Phillips) discloses certain retroreflectors having a non-extensible array of rigid prismatic cube corner elements bonded to an elastomeric film, and was filed when it had been known for years to use a seal film to maintain an air interface for cube corner elements. To maintain the retroreflective properties of his constructions, Phillips teaches that his prism array should crack and split along valleys when minimal tensile force is applied so the prisms remain in position on the elastomeric film and are not significantly distorted. Would it have been obvious to add a seal film, which would impose a network of bonds on the prism array, to the structure of Phillips, without the benefit of hindsight?

## GROUPING OF CLAIMS

For purposes of this appeal, the rejected claims 41, 42, 45-47, and 49-59 stand or fall together. Claim 48 is allowed, and thus stands on its own apart from the other claims.

No admission is being made with respect to the obviousness of the subject matter of independent claims 45 and 52 relative to each other, or of the dependent claims with respect to the subject matter of the independent claims.

## ARGUMENTS OF APPELLANTS

(i) Rejections under 35 U.S.C. § 112, 1st paragraph

(none)

(ii) Rejections under 35 U.S.C. § 112, 2nd paragraph

(none)

(iii) Rejections under 35 U.S.C. § 102

(none)

(iv) Rejections under 35 U.S.C. § 103

*Issue #1 on Appeal: Would it have been obvious to add a seal film to the structure of Phillips?*

The Final Office Action rejected claims 41-42, 45-47, and 49-59 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 5,491,586 (Phillips) or 5,642,222 (Phillips) in view of the "Reflexite's Response to 3M Letter Asserting Infringement of U.S. Patents 5,450,235 and 5,988,820" and further in view of U.S. Patent 4,025,159 (McGrath). (The '586 and '222 Phillips references have substantially identical specifications, and hereafter will be referred to simply as Phillips. Column and line numbers will refer to the later '222 Phillips reference.) The Office Action contends, *inter alia,* that it would have been obvious to apply the teachings of "Reflexite's Response to 3M Letter ..." to Phillips to obtain a first polymeric layer having an elastic modulus less than $7 \times 10^8$ pascals, and a second polymeric layer with cube corner elements formed therein and having an elastic modulus greater than $20 \times 10^8$ pascals. The Office Action further contends that it would have been obvious to apply the teaching of McGrath to Phillips so as to include a sealing film in the retroreflective sheeting of Phillips in order to provide a flat rear surface for bonding the sheeting to a substrate, and for protecting the reflective coating formed on the dihedral facets of the cube corner elements.

The rejection cannot be sustained. It is axiomatic that to establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest each and every limitation of the rejected claim(s). See M.P.E.P. § 2142. Impermissible hindsight analysis must be avoided. *Id.* Furthermore, each reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. See *W.L. Gore Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

In the present application, each rejected independent claim 45 and 52 requires a seal film to maintain an air interface at the cube corner elements. Phillips, the primary reference, teaches away from the use of seal films in a number of ways. Phillips is directed to elastomeric retroreflective structures. It is important to Phillips that these structures, and the retroreflective prism arrays they contain, are capable of being significantly stretched while not significantly diminishing the retroreflective properties of the structures. See e.g. col. 2 lines 18-41 of Phillips. Accordingly, Phillips teaches that the thickness of the non-extensible prism array in the valleys between the prisms is sufficiently thin so that the prism array can crack and split along the valleys when a minimal tensile force is applied. Phillips further teaches that this allows the rigid prisms to remain in position with respect to the elastomeric film member (12) as the retroreflective structure is

significantly stretched, so that the rigid prisms are not significantly distorted and the retroreflective properties of the structure are significantly maintained. See e.g. col. 4 lines 5-20 of Phillips. Phillips also discusses the problem of wetting the surface of the prisms in a way that destroys the air interface and eliminates the ability of the prisms to retroreflect. See e.g. col. 4 lines 21-36. But in each such case *a reflective coating (26) or opaque reflective layer (54)* is provided on the facets of the prisms to maintain their ability to retroreflect. See *Id* and col. 4 at lines 58-65. Significantly, even though seal films to maintain an air interface at cube corner facets were known, e.g. as exemplified by McGrath, Phillips conspicuously avoids mention of such films when discussing the problem of the loss of retroreflection when an adhesive is employed at the prism facets. See col. 4 lines 21-37. Furthermore, in each embodiment of Phillips in which a layer or film is provided on the facet side of the prism array, the drawings exemplify nothing other than uniform, continuous layers and films (see FIGS. 2A-2C and 3A-3C). This is completely consistent with Phillips' desire that the rigid prisms crack and split along the valleys therebetween and remain in position as the retroreflective structure is significantly stretched.

This is also why one of ordinary skill would have no motivation whatsoever to apply the seal film teaching of McGrath to the retroreflective structures of Phillips to yield "a seal film applied to the cube corner elements to maintain an air interface at the cube corner elements" (claim 45) or "a seal film applied to the retroreflective sheeting to maintain an air interface at the cube corner elements" (claim 52). The network of bonds associated with the seal film (see e.g. FIG. 1 of McGrath; see also FIGS. 6-8 of McGrath) would be expected to nonuniformly distribute any tensile force applied to the retroreflective structure, whereby any cracking and splitting along valleys, and the positioning of the prisms, would be much less predictable, raising into question whether the rigid prisms would be significantly distorted and/or whether the retroreflective properties of the structure would be maintained.

The Final Office Action contends that one reason why the person of ordinary skill would have been motivated to apply the seal film of McGrath to the retroreflective structure of Phillips is to provide a flat rear surface for bonding the sheeting of Phillips to a substrate. This however overlooks the fact that Phillips already provides retroreflective structures that have flat rear surfaces – see e.g. FIGS. 2A-C and 3A-D. Note in particular elastomeric layer 44, the formation of which is described at col. 4 lines 51-57. One would not be motivated to apply the teachings of McGrath to provide a feature that is already present in Phillips.

The Final Office Action contends that another reason why the person of ordinary skill would have been motivated to apply the seal film of McGrath to the retroreflective structure of Phillips is to protect the reflective coating formed on the facets of the cube corner elements from external damage, to maintain retroreflectivity. But this again overlooks elastomeric layer 44 in FIGS. 2A-C and 3A-D of Phillips, which already protects the reflective layer 54 present on the prism facets. Again, one would not be motivated to apply the teachings of McGrath to provide a feature that is already present in Phillips.

Lastly, the Final Office Action contends that the addition of a seal film would not destroy the properties of the retroreflective sheeting in FIG. 1 of Phillips because the person of ordinary skill would use a seal film of a polymeric material having a low elastic modulus as that of the first layer. However, whether the seal film has a low elastic modulus or not does not change the fact that the seal film is applied to the cube corner array in a network of discrete bonds, which will have ramifications on the splitting behavior between cubes.

Further, it is instructive to take note of U.S. Patent 6,143,224 (Bernard et al.), "Method for Forming a Retroreflective Sheeting", assigned to the same assignee as the Phillips reference and filed almost two years after the priority date of Phillips. Bernard et al. disclose cube corner retroreflective sheetings utilizing an array 14 of rigid prisms 16 that can crack and split along the valleys 22 when a minimal force is applied, and the prisms are attached to a base film 12. The Bernard et al. sheetings also have a seal film ("backing film 24") applied to the cube corner array in mutli-course, hatched pattern perimeters. Bernard et al. note that the prism array 14 "appears to act as a barrier to the welding of the ... base film 12 ... to the ... backing film 24." (Col. 4 lines 44-46.) Bernard et al. further note that "[i]f the depth of seal is not too great, if too little pressure is applied, the prisms do not sufficiently move, and this results in *no weld at all.*" (Col. 7 lines 12-14, emphasis added.) The later Bernard et al. reference thus further demonstrates challenges and problems associated with the Examiner's creative modification of Phillips.

The teachings of "Reflexite's Response to 3M Letter ..." do not remedy the shortcomings of the Phillips/ McGrath combination mentioned above.

In summary, since the references do not provide the requisite motivation, teaching, or suggestion necessary to support a *prima facie* case of obviousness, the rejection of claims 45 and 52, and their dependent claims 41-42, 46-47, 49-51, and 53-59, should be overturned.

(v) General

Independent claim 48 has not been rejected, and is allowable for reasons given previously by the Examiner, i.e., that the prior art fails to teach or suggest a retroreflective sheeting with the recited elements,, wherein the third major surface of the second layer attaches through only a thin coating of primer to the second major surface of the first layer.

## CONCLUSION

Phillips was filed at a time when the use of a seal film to maintain an air interface for cube corner elements had been known for many years. Phillips even discusses the possible loss of an air interface at the cube faces, but points instead to the use of reflective coatings on the prism facets. To maintain the retroreflective properties of the structure, Phillips teaches that his rigid prism array should crack and split along valleys when minimal tensile force is applied so the prisms remain in position on the elastomeric film and are not significantly distorted. It would not have been obvious to add a seal film, which would impose a network of bonds on the prism array, to the structure of Phillips without the benefit of improper hindsight.

At least for this reason, appellants respectfully submit that the Examiner has erred in rejecting this application. Please reverse the Examiner's finding of obviousness under 35 U.S.C. § 103(c).

Respectfully submitted,

12 May 2004
Date

By: Stephen C. Jensen
Stephen C. Jensen, Reg. No.: 35,207
Telephone No.: (651) 736-3369

Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833

## APPENDIX: PENDING CLAIMS

41. The sheeting of claim 45, wherein the retroreflective sheeting does not exhibit a substantial loss of retroreflectivity when flexed.

42. The sheeting of claim 45, wherein the second layer includes a land layer, and the land layer is integral with the cube corner elements.

45. A retroreflective sheeting, comprising:

(a) a first layer comprising a first polymeric material having an elastic modulus less than $7 \times 10^8$ pascals, the first layer having a first and second major surface and allowing light that enters the first layer through either the first or the second major surface to pass through the first layer to exit the first layer through the other major surface; and

(b) a second layer comprising a second polymeric material having an elastic modulus greater than $20 \times 10^8$ pascals, the second layer having a third major surface and having a surface opposite the third major surface in which cube corner elements are formed, wherein the cube corner elements are exposed to air; and

(c) a seal film applied to the cube corner elements to maintain an air interface at the cube corner elements;

wherein the third major surface of the second layer attaches directly or through only a thin coating to the second major surface of the first layer.

46. The sheeting of claim 45, wherein the second layer attaches directly to the first layer.

47. The sheeting of claim 45, wherein the second layer attaches to the first layer through the thin coating, the thin coating promoting adhesion between the first and second layers.

48. A retroreflective sheeting, comprising:

(a) a first layer comprising a first polymeric material having an elastic modulus less than 7 x 108 pascals, the first layer having a first and second major surface and

allowing light that enters the first layer through either the first or the second major surface to pass through the first layer to exit the first layer through the other major surface; and

(b) a second layer comprising a second polymeric material having an elastic modulus greater than 20 x 108 pascals, the second layer having a third major surface and having a surface opposite the third major surface in which cube corner elements are formed;

wherein the third major surface of the second layer attaches directly or through only a thin coating to the second major surface of the first layer;

wherein the second layer attaches to the first layer through the thin coating, the thin coating promoting adhesion between the first and second layers; and

wherein the thin coating is a primer.

49. The sheeting of claim 45, wherein the second polymeric material comprises poly(carbonate).

50. The sheeting of claim 45, wherein the second polymeric material comprises poly(methylmethacrylate).

51. The sheeting of claim 45, wherein the first layer is an outermost layer on a front side of the sheeting.

52. A retroreflective article, comprising:

(a) a retroreflective sheeting having cube corner elements; and

(b) a seal film applied to the retroreflective sheeting to maintain an air interface at the cube corner elements;

wherein the retroreflective sheeting consists essentially of:

(c) a first layer composed of a first light transmissible polymeric material having an elastic modulus less than 7 x 108 pascals, the first layer having first and second major surfaces; and

(d) a second layer composed of a second light transmissible polymeric material having an elastic modulus greater than $20 \times 10^8$ pascals, the second layer having a third major surface attached directly or through only a thin coating to the second major surface of the first layer, the second layer also having the cube corner elements formed on a surface opposite the third major surface.

53. The article of claim 52, wherein the retroreflective sheeting does not exhibit a substantial loss of retroreflectivity when flexed.

54. The article of claim 52, wherein the second layer attaches directly to the first layer.

55. The article of claim 52, wherein the second layer attaches to the first layer through the thin coating, the thin coating promoting adhesion between the first layer and the second layer.

56. The article of claim 52, wherein the second layer consists essentially of the cube corner elements and an integral land layer, the land layer providing the third major surface of the second layer.

57. The article of claim 52, wherein the second polymeric material comprises poly(carbonate).

58. The article of claim 52, wherein the second polymeric material comprises poly(methylmethacrylate).

59. The article of claim 52, wherein the first layer is an outermost layer on a front side of the sheeting.